181*a*-**181***n* may include identifying markers or may include fiducial markers, such as retro-reflective tags, to enable augmented reality application **150** to uniquely identify a position and/or orientation of each object that is included in physical objects **181***a*-**181***n*.

[0028] Augmented reality application **150** may monitor the position and/or orientation of each object of physical objects **181***a*-**181***n* by sampling each object's position and/or orientation using monitoring device **170**. Augmented reality application **150** may detect a change in position and/or orientation of an object of physical objects **181***a*-**181***n* and track the change in position and/or orientation of the physical object of physical objects **181***a*-**181***n*. Augmented reality application **150** may be trained on the configuration of display surface **180**, i.e., augmented reality application **150** may be calibrated to determine a distance between two points on display surface **180**. When augmented reality application **150** detects a change in position and/or orientation of an object of physical objects **181***a*-**181***n*, augmented reality application **150** may determine the distance between the initial position/orientation, and based on the sampling information, determine a direction of the motion, and/or a velocity of the motion. In some implementations, augmented reality application **150** may receive monitoring and/or tracking data from monitoring device **170**, update the virtual world using virtual world displaying device **170**, and update the augmented reality using augmented reality projector **162**, based on the monitoring and tracking data.

[0029] System **100** may determine the user input for controlling the virtual element by tracking the interaction or manipulation of physical object **181**. In some implementations, the user input may correspond to a change in the real-world position of physical object **181**, or the user input may correspond to a change in the real-world orientation of physical object **181**. The manipulation of physical object **181** may directly or indirectly correlate to the desired action of the ship in the real world. For example, when the user is using a plate to navigate a ship through the virtual world, the user may turn the plate to turn the ship as it sails, effectively using the plate as a steering wheel. Accordingly, a change in the real-world orientation of the plate may turn the ship in the virtual world. Similarly, a user may control a video game by changing the real-world position of physical object **181**. To monitor and/or track the real-world location and real-world orientation of physical object **181**, system **100** may use computer vision. Monitoring device **170** may be an infrared camera and may monitor and/or track physical objects **181***a*-**181***n* using unique infrared markings or tags on each physical object **181***a*-**181***n*.

[0030] Additionally, augmented reality projector **162** may project virtual elements onto some or all of physical objects **181***a*-**181***n*. The virtual world may become more interactive when physical objects **181***a*-**181***n* in the real world becomes a part of the virtual world. Similarly, augmented reality application **150** may be calibrated to recognize physical object **181** as a virtual object. For example, augmented reality application **150** may incorporate a training phase during which a user may be asked to select one of physical objects **181***a*-**181***n* to represent a sword in the virtual world. The user may select a knife from the table setting and place the knife in a designated location on display surface **180**, and augmented reality application **150**, using a camera or other monitoring device **170**, may learn the object and incorporate the knife as a sword in the virtual world. In other implementations, augmented reality application **150** may be trained on one or more of physical objects **181***a*-**181***n*, allowing augmented reality application **150** to identify those objects without an additional training step.

[0031] At **530**, system **100** updates, using augmented reality projector **162**, the user control projected onto the physical object based on the user manipulation of the physical object to maintain the visual representation correlated with the virtual element in the virtual world. As the user manipulates physical object **181** to control the virtual element, physical object **181** may change position, orientation, or both position and orientation. In order to maintain the correlation with the virtual element, the system **100** may project an updated visual representation of the virtual element projected onto physical object **181** to reflect any change in orientation of the virtual element, and compensate for any change in location of physical object **181**.

[0032] At **540**, system **100** tracks a position of a first object of a plurality of physical objects on the display surface. In some implementations, physical objects **181***a*-**181***n* may include a physical object **181** that may not be used for user control input. For example, when display surface **180** includes a tabletop on which plates are used to steer ships through a virtual world, silverware and condiments may also be placed on the tabletop. In some implementations, system **100** may monitor and/or track these other physical objects. Additionally, system **100** may determine a position in the virtual world corresponding to the real-world position of each physical object **181***a*-**181***n*.

[0033] At **550**, system **100** inserts a virtual object into the virtual world at a location in the virtual world corresponding to the position of the first object on the display surface. Physical objects **181***a*-**181***n* may be used to create objects and/or obstacles in the virtual world. For example, when in the virtual world is an ocean through which the user navigates a ship, a salt shaker may be placed at a location on the tabletop, and system **100** may insert a mountain or island into the virtual world at a location corresponding to the real-world position of the salt shaker.

[0034] From the above description it is manifest that various techniques can be used for implementing the concepts described in the present application without departing from the scope of those concepts. Moreover, while the concepts have been described with specific reference to certain implementations, a person of ordinary skill in the art would recognize that changes can be made in form and detail without departing from the scope of those concepts. As such, the described implementations are to be considered in all respects as illustrative and not restrictive. It should also be understood that the present application is not limited to the particular implementations described above, but many rearrangements, modifications, and substitutions are possible without departing from the scope of the present disclosure.

What is claimed is:

1. A system comprising:

a projector;

a display surface for displaying a virtual world;

a physical object;

a memory storing an augmented reality software program; and

a processor executing the augmented reality software program to: